

### **Remarks**

Claims 1-31 are currently pending in the subject application. Applicants add new claims 32 to 48 herein. In the Office Action, claims 12 and 26 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. Claims 1-7, 9, 11, 13-20, and 22-31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 3,279,794 to Douglass (“Douglass”) in view of U.S. Patent No. 4,378,330 to Verhoeven et al. (“Verhoeven”). Claims 8, 10, and 12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Douglass in view of Verhoeven and further in view of U.S. Patent No. 6,709,536 to Kim et al. (“Kim”). Claim 21 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Douglass in view of Verhoeven and further in view of U.S. Patent No. 4,629,515 to Imaizumi et al. (“Imaizumi”). Applicants traverse these rejections and respectfully submit the following amendments, remarks and arguments to overcome the rejections.

### **New Claims**

New claims 32 to 48 have been added to the subject application. Applicants respectfully submit that the new claims presented herein are fully supported by the application as originally filed. Accordingly, passage of these new claims to allowance is requested.

### **Amendments to the Claims**

Claim 10 has been amended to correct the dependency. Claim 10, as amended now depends from claim 1. Claim 10 has also been amended to correct a typographical error, the term “matrix metal” has been amended to “fiber metal”. This amendment is supported in the specification at Paragraph 0033, Page 10, line 5. Claim 12 has been amended to depend from

claim 11, discussed below. Claim 26 has been amended to depend from claim 20, as discussed below.

#### **Claim Rejections - 35 U.S.C. § 112, Second Paragraph**

Claims 12 and 26 stand rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. For claim 12, the Examiner states that the term “the deforming” lacks antecedent basis. The lack of antecedent basis arose from a typographical error during claim drafting. Applicants have amended claim 12 to depend from claim 11, thereby providing proper antecedent basis for the term “the deforming”.

For claim 26, the Examiner states that the claim is unclear because the claimed scope is redundant to claim 25. Applicants have amended claim 26, to depend from claim 20 rather than claim 25. Amended claim 26 limits the scope of claim 20 and has a scope that is no longer redundant with claim 25. Amendments to claims 12 and 26 are supported by the specification. Based on the amendments to claims 12 and 26, Applicants respectfully request the withdrawal of the rejection of these claims under 35 U.S.C. § 112, second paragraph.

#### **Claim Rejections - 35 U.S.C. § 103(a)**

##### Douglass in view of Verhoeven:

Claims 1-7, 9, 11, 13-20, and 22-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Douglass in view of Verhoeven. According to § 2143 of the MPEP, “[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the

prior art reference (or references when combined) must teach or suggest all the claim limitations.” Applicants respectfully submit that the claims are non-obvious over the cited prior art for at least the reason that the prior art does not suggest or motivate one to combine the teachings of Douglass and Verhoeven, nor do the references teach or suggest all of the claim limitations.

Douglass discloses a composite material comprising a fibrous reinforcing refractory metal in a matrix of a second metal. (*Claim 1, column 7, lines 20-23*). The fibrous reinforcing refractory metal forms a felt produced by press molding and sintering a powder of the metal. (*Column 2, lines 9-26*). Douglass discloses compacts made of tantalum. (*Examples 1, 3 and 11*). The resulting tantalum compacts have densities that are from 40-80 percent of the theoretical density of pure tantalum. (*Column 4, lines 10 and 48, and column 7, lines 3-4*). The sintering process is followed by impregnation of the powder compact by dipping the compact in a melt of the second metal. (*Column 2, lines 26-29*). The impregnated composite is processed such that the powder particles form long fibers within the matrix of the second metal. (*Column 2, lines 44-47*). The second metal is chosen and impregnated such that it will “not alloy extensively with the first metal.” (*Column 2, line 39*). The matrix metal may then be removed by leaching with nitric acid to form a fiber bundle or felt. (*Column 3, line 58*). The resultant felt contains substantial cross-linking by metallurgical bonds between the fibers where the bonds were formed in part by the sintering of the powder particles. (*Column 3, lines 31-35*).

In contrast, Verhoeven discloses the formation of a “ductile alloy” suitable for superconducting wire formation. (*Column 1, lines 64-65*). The alloy is prepared by heating copper and niobium to melting temperature and rapidly cooling to form a ductile composite of a copper matrix and a “plurality of discrete randomly distributed and oriented dendritic-shaped

fibers of niobium.” (*Column 2, lines 7-14*). The purpose of Verhoeven invention is the production of ductile superconducting wires with extremely fine discontinuous niobium fibers. The wires can be wound in coils or similar forms then coated and diffused with tin at low temperatures to convert the fibers into Nb<sub>3</sub>Sn, a brittle compound. (*Column 2, lines 22-33*).

The Douglass process specifically requires that the second metal “not alloy extensively with the first metal” (*column 2, line 39*), whereas Verhoeven necessarily requires the copper and niobium to form an alloy (*see column 1, line 67*). The Douglass disclosure therefore teaches away from Verhoeven and would not motivate one skilled in the art to combine the two references. In addition, the composition disclosed in Verhoeven is a superconducting wire that can be coiled then diffused with tin. Removal of the matrix would be counter to the purpose of Verhoeven since the resulting discontinuous fibers could not act as a superconducting wire. According to the MPEP § 2143.01, “[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” There is no suggestion or motivation to combine the teachings of Douglass and Verhoeven. Thus a *prima facie* case of obviousness under 35 U.S.C. § 103(a) has not been established and rejection of the claims under a combination of the cited prior art references is not proper. Applicants respectfully request withdrawal of the rejection of claims 1-7, 9, 11, 13-20, and 22-31.

Douglass also discloses a metal composite of a sintered first metal compact impregnated with a second metal. Douglass discloses the use of tantalum as the first metal. Due to the sintering and compacting process, the resulting compact has a density of at least 40% of pure tantalum. Douglass’ process of impregnating with a metal such as copper, will result in a solid metallic composite that has a tantalum density of at least 40% and a copper density of at

most 60%. Converting these percent density values to weight percent, one finds that the Douglass process requires at least 55% weight of tantalum in the resultant composite (calculations presented below). Compacts are not formed below this percent tantalum.

$$\begin{aligned}\text{Total weight of 1 mL composite} &= (\% \text{density Ta})(\text{density of Ta}) + (\% \text{density Cu})(\text{density Cu}) \\ &= (40\%)(16.6 \text{g Ta}) + (60\%)(8.92 \text{g Cu}) \\ &= 6.64 \text{ g Ta} + 5.35 \text{ g Cu} = 11.99 \text{ g composite}\end{aligned}$$

$$\text{Weight percent Ta} = [(6.64 \text{ g Ta}) \div (11.99 \text{ g composite})] \times 100 = 55 \text{ wt.\%}$$

In contrast, the disclosure of the subject application requires between 0 wt.% up to 70 wt.% of fiber metal, preferably 5 wt.% to 50 wt.%, more preferably 15 wt.% to 50 wt.% and for certain embodiments 15 wt.% to 25 wt%. (*Paragraph 0033, pages 9-10*). In the subject application, lower weight percentages are used when both yield of fiber and high surface area of the fibers are desired. Due to the nature of the sintering and compacting process, it is likely that the process disclosed in Douglass could not be used to form composites with these lower weight percents. Thus Douglass teaches away from using weight percents of metal less than 55% and the combination with Verhoeven, using weight percents less than 50%, would render the Douglass process inoperable. Thus a *prima facie* case of obviousness for weight percents less than 55% has not been established under 35 U.S.C. § 103(a) and rejection of the claims 10 and 24 under a combination of the cited prior art references is not proper. Applicants respectfully request withdrawal of the rejection of claims 10 and 24.

Douglass in view of Verhoeven further in view of Kim:

Claims 8, 10, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Douglass in view of Verhoeven and further in view of Kim. As discussed above, there is no motivation or suggestion to combine the teachings of Douglass and Verhoeven

and as discussed above, the combination would render the Douglass process inoperable. Therefore, the rejection based on the combination of Douglass and Verhoeven further in view of Kim does not present a prima facie case of obviousness. Applicants respectfully request withdrawal of the rejection of claims 8, 10, and 12.

Douglass in view of Verhoeven further in view of Imaizumi:

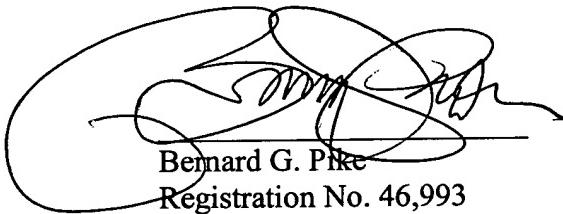
Claim 21 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Douglass in view of Verhoeven and further in view of Imaizumi. As discussed above, there is no motivation or suggestion to combine the teachings of Douglass and Verhoeven and as discussed above, the combination would render the Douglass process inoperable. Therefore, the rejection based on the combination of Douglass and Verhoeven further in view of Imaizumi does not present a prima facie case of obviousness. Applicants respectfully request withdrawal of the rejection of claim 21.

### Conclusion

Applicants believe that they have fully addressed each basis for rejection.

Reconsideration of the claims of the subject application and issuance of a Notice of Allowability is respectfully requested. Should the Examiner have any remaining concerns, he is requested to contact the undersigned at the telephone number below so that those concerns may be addressed without the necessity of issuing an additional Office Action.

Respectfully submitted,



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